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ABSTRACT

Ten criteria for use in assessing the emphasis on environmental education in textbooks and similar resource materials were developed and given to 30 members of the Australian Conservation Foundation Education and Training Committees throughout the country. Each rater applied the criteria to three chapters of a biology textbook "The Web of Life," the Australian adaptation of the Biological Sciences Curriculum Study materials) and three units of the Australian Science Education Project materials (see ED 061 106 and ED 063 167 for two of the units). The results of the rating are presented, and, where appropriate, the maximum deviation from a cumulative reference distribution based on random rating (Kolmogorov-Smirnov one-sample test) is presented. The reliability of each index, and difficulties encountered in its use, are discussed. Copies of the scales, instructions and explanations provided to raters, and the rationale for each criterion are included in an appendix to the report. (AL)

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ENVIRONMENTAL EDUCATION RESEARCH PROJECT

CONTENT ANALYSIS CRITERIA

REPORT ON FIRST EVALUATION TRIAL

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FACULTY OF EDUCATION
MONASH UNIVERSITY

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INTRODUCTION

This aspect of the Environmental Education Research Project involves an attempt to assess the emphasis on Environmental Education in various textbooks and other similar resource materials through the application of content analysis techniques. Thus a series of ten criteria considered to involve important aspects of Environmental Education were defined, and appropriate rating scales or classification divisions were then selected. These indices, together with explanatory notes, evaluation sheets, and appropriate resource materials for assessment, were then sent to each of thirty members of the A.C.F. Education and Training Committee throughout Australia. All of these people were experienced in science teaching, and many of them specifically in Environmental Studies, and so were considered well qualified to comment on both the appropriateness or validity and on the general applicability of these criteria, in addition to providing valuable information on the rating reliability of the various index scales. Specific comments relating to particular indices are incorporated with the discussion of individual index results, while other more general information is presented in the final discussion.

EXPLANATION OF TABLES

The numbers presented in each category represent the number of judges selecting that particular rating or classification. The modal (most frequently selected) rating is also given in each appropriate case. The figures under K.S.D. represent the maximum deviation from a cumulative reference distribution based on random selection or rating, calculated according to the Kolmogorov-Smirnov one-sample test (1). The letters under P indicate the significance of this deviation at the 0.05 probability level. Thus S represents a significant deviation from random rating, and NS a non-significant deviation, suggesting a total lack of concordance on that scale. Ideally, of course, one should test the deviation from perfectly concordant, rather than from random ratings, but at this stage the latter is useful enough. A selection of appropriate comments relating to the general applicability of the relevant index is presented with each table of results.

RESULTS

(1) SIEGEL - Nonparametric Statistics.

I ENVIRONMENTAL EMPHASIS

TITLE	RATING 0	1	2	3	TOTAL	MODAL RATING	K.S.D. P
THE WEB OF LIFE (CH. 1)	2	5	3	5	15	1/3	0.12 (NS)
(CH.18)	13	2	0	0	15	0	0.62 (S)
(CH.41)	3	7	2	3	15	1	0.17 (NS)
HOW MANY PEOPLE (ASEP)	1	16	0	0	17	1	0.50 (S)
LIFE IN FRESHWATER (ASEP)	0	3	6	8	17	3	0.32 (S)
THE EARTH (ASEP)	6	8	2	0	16	1	0.38 (S)

This index, which is undoubtedly the most important, and in fact fundamental to all the others, also proved one of the most difficult to use. Although none of the judges questioned the validity of its definition, there were several suggestions for modifying the method of quantification, including the use of a "continuum" scale which could later be reduced to ordinal ratings, and of a more precise rating involving the number of positive references (or instances of

selection or rating, calculated according to the Kolmogorov-Smirnov one-sample test (1). The letters under P indicate the significance of this deviation at the 0.05 probability level. Thus S represents a significant deviation from random rating, and NS a non-significant deviation, suggesting a total lack of concordance on that scale. Ideally, of course, one should test the deviation from perfectly concordant, rather than from random ratings, but at this stage the latter is useful enough. A selection of appropriate comments relating to the general applicability of the relevant index is presented with each table of results.

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(CH.41)	3	7	2	3	15	1	0.17 (NS)
HOW MANY PEOPLE (ASEP)	1	16	0	0	17	1	0.50 (S)
LIFE IN FRESHWATER (ASEP)	0	3	6	8	17	3	0.32 (S)
THE EARTH (ASEP)	6	8	2	0	16	1	0.38 (S)

This index, which is undoubtedly the most important, and in fact fundamental to all the others, also proved one of the most difficult to use. Although none of the judges questioned the validity of its definition, there were several suggestions for modifying the method of quantification, including the use of a "continuum" scale which could later be reduced to ordinal ratings, and of a more precise rating involving the number of positive references (or instances of human/environmental interaction)/ 10 pages of text. It was also pointed out that the verbal equivalents suggested as indicators for each rating division did not imply equal intervals on the rating scale, and this sometimes caused difficulties in selection.

Other problems with the application of this criterion may well have been caused by a lack of appropriate examples, since only a few were given, and these were all relatively clear. Some difficulties were also reported with terminology, and further clarification was

asked for such terms as "analytical category", "biophysical environment", "explicit interactions" and "emotive impact".

Perhaps one of the most important and serious problems in using this criterion, reported in various ways by many of the judges, was the tendency to relax their interpretation of the criterion, and thus to lose focus on explicitly human/environmental interactions. The result of this was almost certainly a tendency to infer such interactions in passages where no explicit reference was made, and thus by this definition to over-rate the section. It should, I believe, be stressed that although there may well be a case for the recognition of other relevant background information and its association with the criterion in question, its relevance will be dependent on certain unmeasurable characteristics of the reader, so that any objective rating can only be made on the basis of explicit content.

Since the application of all subsequent criteria is dependent on the interpretation of the first, it is likely that many of the rating discrepancies occurring in later indices would have been caused by the same problem of interpretation, and that clarification of this point could improve substantially the effectiveness of the other criteria.

II QUALITATIVE ENVIRONMENTAL INDEX

TITLE	CLASSIFICATION				
	--	-	0	+	++
THE WEB OF LIFE (CH. 1)	0	2	7	4	1
(CH.18)	0	0	6	1	0
(CH.41)	1	2	7	5	0
HOW MANY PEOPLE (ASEP)	8	5	0	7	3
LIFE IN FRESHWATER (ASEP)	6	8	1	11	3
THE EARTH (ASEP)	3	2	9	3	0

This index involves a measure of both the nature and intensity of explicit environmental interaction. The former measure, which is

to lose focus on explicitly human/environmental interactions. The result of this was almost certainly a tendency to infer such interactions in passages where no explicit reference was made, and thus by this definition to over-rate the section. It should, I believe, be stressed that although there may well be a case for the recognition of other relevant background information and its association with the criterion in question, its relevance will be dependent on certain unmeasurable characteristics of the reader, so that any objective rating can only be made on the basis of explicit content.

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II QUALITATIVE ENVIRONMENTAL INDEX

TITLE	CLASSIFICATION				
	--	-	0	+	++
THE WEB OF LIFE (CH. 1)	0	2	7	4	1
(CH.18)	0	0	6	1	0
(CH.41)	1	2	7	5	0
HOW MANY PEOPLE (ASEP)	8	5	0	7	3
LIFE IN FRESHWATER (ASEP)	6	8	1	11	3
THE EARTH (ASEP)	3	2	9	3	0

This index involves a measure of both the nature and intensity of explicit environmental interaction. The former measure, which is effectively a type classification and involves only three sections of the scale (+/0/-), appears to be fairly consistent in the results above, where several of the listed titles have a strong modal rating at 0, while others tend to be polarised in the +/- divisions. The intensity ratings, however, are not so consistent, and it may be possible to exclude these from the scale without a significant loss of analytical information. Despite the lack of consistency in this aspect of classification, the only difficulty mentioned by the judges was that of interpreting the object of the advantageous or detrimental interactions defined by criterion I. It is emphasised in

the index description, however, that either human or environmental interests may be considered in this classification, since both are inextricably related.

III CONSERVATIONAL CLASSIFICATION

TITLE	CLASSIFICATION			
	AC	O	C(S)	C(M)
THE WEB OF LIFE (CH. 1)	0	10	1	2
(CH.18)	0	7	0	0
(CH.41)	0	12	1	0
HOW MANY PEOPLE (ASEP)	0	0	2	15
LIFE IN FRESHWATER (ASEP)	0	1	6	10
THE EARTH (ASEP)	0	14	0	0

No difficulties were reported with the application of this criterion, and the ratings were, with one exception (ASEP-Life in Freshwater), very consistent. Perhaps the only potential problem exists in the interpretation, and therefore definition of the C(S) and C(M) divisions, and might be clarified with a descriptive example.

IV EMOTIVE INTENSITY

TITLE	RATING				TOTAL	MODAL RATING	K.S.D. P
	0	1	2	3			
THE WEB OF LIFE (CH. 1)	11	2	0	0	13	0	0.60 (S)
(CH.18)	7	0	0	0	7	0	0.75 (S)
(CH.41)	13	0	0	0	13	0	0.75 (S)
HOW MANY PEOPLE (ASEP)	5	3	5	4	17	0/2	0.07 (NS)
LIFE IN FRESHWATER (ASEP)	5	6	6	0	17	1/2	0.25 (NS)
THE EARTH (ASEP)	14	0	0	0	14	0	0.75 (S)

This index generally gave excellent agreement where the modal

TITLE	CLASSIFICATION			
	AC	O	C(S)	C(M)
THE WEB OF LIFE (CH. 1)	0	10	1	2
(CH.18)	0	7	0	0
(CH.41)	0	12	1	0
HOW MANY PEOPLE (ASEP)	0	0	2	15
LIFE IN FRESHWATER (ASEP)	0	1	6	10
THE EARTH (ASEP)	0	14	0	0

No difficulties were reported with the application of this criterion, and the ratings were, with one exception (ASEP-Life in Freshwater), very consistent. Perhaps the only potential problem exists in the interpretation, and therefore definition of the C(S) and C(M) divisions, and might be clarified with a descriptive example.

IV EMOTIVE INTENSITY

TITLE	RATING				TOTAL	MODAL RATING	K.S.D. p
	0	1	2	3			
THE WEB OF LIFE (CH. 1)	11	2	0	0	13	0	0.60 (S)
(CH.18)	7	0	0	0	7	0	0.75 (S)
(CH.41)	13	0	0	0	13	0	0.75 (S)
HOW MANY PEOPLE (ASEP)	5	3	5	4	17	0/2	0.07 (NS)
LIFE IN FRESHWATER (ASEP)	5	6	6	0	17	1/2	0.25 (NS)
THE EARTH (ASEP)	14	0	0	0	14	0	0.75 (S)

This index generally gave excellent agreement where the modal rating was zero, but the distribution of ratings in other cases was not significantly different from random. This lack of agreement could have been caused by confusion between a rating of overall personal impact on the reader, which would be strongly influenced by a number of complex personal factors, and that based on a quantitative assessment of emotive language, as defined in the explanation of this criterion. It would be possible to overcome this problem by using a simple emotive/non-emotive dichotomous

classification, which may lose a considerable amount of information on relative intensity, but should at least maintain a high level of concordance. Alternatively the existing scale must be more precisely defined, and the prospective judges better instructed in its application. It is interesting to note that, despite the serious lack of agreement on all non-zero ratings, none of the judges reported any real difficulties in using this scale.

V SUBJECT AREA

	TITLE	CLASSIFICATION				
		BIOPHYSICAL	SOCIAL	ECONOMIC	AESTHETIC	
T	THE WEB OF LIFE (CH. 1)	13	1	0	0	
	(CH.13)	7	0	0	0	
	(CH.41)	12	1	0	0	
	HOW MANY PEOPLE (ASEP)	15	9	2	0	
	LIFE IN FRESHWATER (ASEP)	16	4	1	0	
	THE EARTH (ASEP)	13	0	0	1	

No problems were reported in using this index, and the only suggestion for modification involved the addition of a "nil" category to cover those materials with no particular subject emphasis. The occasional "economic" and "aesthetic" classifications may indicate some misinterpretation of the index as <u>total</u> rather than <u>predominant</u> subject emphasis, as defined in the explanation, and it may be useful to give more stress to this aspect of the definition.

VI PREDOMINANT REGIONAL EMPHASIS

TITLE	LOCAL		GENERAL
	AUSTRALIA	ELSEWHERE	
THE WEB OF LIFE (CH. 1)	1	0	12
(CH.18)	0	0	7
(CH.41)	1	3	9

real difficulties in using this scale.

V SUBJECT AREA

	TITLE	CLASSIFICATION				
		BIOPHYSICAL	SOCIAL	ECONOMIC	AESTHETIC	
T	THE WEB OF LIFE (CH. 1)	13	1	0	0	
	(CH.18)	7	0	0	0	
	(CH.41)	12	1	0	0	
	HOW MANY PEOPLE (ASEP)	15	9	2	0	
	LIFE IN FRESHWATER (ASEP)	16	4	1	0	
	THE EARTH (ASEP)	13	0	0	1	

No problems were reported in using this index, and the only suggestion for modification involved the addition of a "nil" category to cover those materials with no particular subject emphasis. The occasional "economic" and "aesthetic" classifications may indicate some misinterpretation of the index as total rather than predominant subject emphasis, as defined in the explanation, and it may be useful to give more stress to this aspect of the definition.

VI PREDOMINANT REGIONAL EMPHASIS

TITLE	LOCAL		GENERAL
	AUSTRALIA	ELSEWHERE	
THE WEB OF LIFE (CH. 1)	1	0	12
(CH.18)	0	0	7
(CH.41)	1	3	9
HOW MANY PEOPLE (ASEP)	11	1	6
LIFE IN FRESHWATER (ASEP)	12	0	6
THE EARTH (ASEP)	7	1	7

Although no problems were reported with this classification, there were a few possible modifications suggested. These include a state sub-classification for "Local/Australia" to assist in the selection of relevant materials for teachers in different states, the inclusion of a separate "nil" category to cover those materials with no particular regional emphasis, and a rating of the total number of illustrative examples, with a regional classification of each. Although these modifications may all provide useful additional information, the extended application time, for some at least, would probably be prohibitive. They should, however, be examined more closely in subsequent trials.

VII QUANTITATIVE EMPHASIS

TITLE	RATING 0	1	2	3	TOTAL	MODAL RATING	K.S.D. p
THE WEB OF LIFE (CH.1)	7	4	1	1	13	0	0.35 (S)
(CH.18)	6	1	0	0	7	0	0.61 (S)
(CH.41)	4	3	6	0	13	2	0.25 (NS)
HOW MANY PEOPLE (ASEP)	0	1	10	6	17	2	0.38 (S)
LIFE IN FRESHWATER (ASEP)	11	3	1	2	17	0	0.40 (S)
THE EARTH (ASEP)	6	2	4	2	14	0	0.18 (NS)

The most significant problem reported with this index was the difficulty in distinguishing between ratings 1 and 2, that is between "rare" and "occasional" quantitative references, and it was accordingly suggested that these could be combined without significant loss of information. This may well be a useful modification, and if applied to the existing data would certainly make some improvement, though it would still leave a significant level of disagreement on title 6 ("The Earth"). It seems likely, as explained in the results of index I, that this discrepancy may be caused by the failure in some cases to associate quantitative references with the primary criterion of human/environmental interaction, resulting in a tendency to over-rate the material by incorporating non-environmental data.

One question was asked on the applicability of this index in the situation where little data is given, but where the reader is asked

no particular regional emphasis, and a rating of the total number of illustrative examples, with a regional classification of each. Although these modifications may all provide useful additional information, the extended application time, for some at least, would probably be prohibitive. They should, however, be examined more closely in subsequent trials.

VII QUANTITATIVE EMPHASIS

TITLE	RATING				TOTAL	MODAL RATING	K.S.D. P
	0	1	2	3			
THE WEB OF LIFE (CH.1)	7	4	1	1	13	0	0.35 (S)
(CH.18)	6	1	0	0	7	0	0.61 (S)
(CH.41)	4	3	6	0	13	2	0.25 (NS)
HOW MANY PEOPLE (ASEP)	0	1	10	6	17	2	0.38 (S)
LIFE IN FRESHWATER (ASEP)	11	3	1	2	17	0	0.40 (S)
THE EARTH (ASEP)	6	2	4	2	14	0	0.18 (NS)

The most significant problem reported with this index was the difficulty in distinguishing between ratings 1 and 2, that is between "rare" and "occasional" quantitative references, and it was accordingly suggested that these could be combined without significant loss of information. This may well be a useful modification, and if applied to the existing data would certainly make some improvement, though it would still leave a significant level of disagreement on title 6 ("The Earth"). It seems likely, as explained in the results of index I, that this discrepancy may be caused by the failure in some cases to associate quantitative references with the primary criterion of human/environmental interaction, resulting in a tendency to over-rate the material by incorporating non-environmental data.

One question was asked on the applicability of this index in the situation where little data is given, but where the reader is asked to obtain more himself. This situation would be covered by an independent rating of both the given data (on this index), and that required, which would probably be included in index X (Practical Activities).

VIII PICTORIAL EMPHASIS

	RATING				TOTAL	MODAL RATING	K.S.D. P
	0	1	2	3			
THE WEB OF LIFE (CH. 1)	4	2	1	6	13	3	0.21 (NS)
(CH.18)	5	0	0	2	7	0	0.47 (S)
(CH.41)	4	5	1	3	13	1	0.19 (NS)
HOW MANY PEOPLE (ASEP)	0	0	3	14	17	3	0.57 (S)
LIFE IN FRESHWATER (ASEP)	0	1	1	15	17	3	0.63 (S)
THE EARTH (ASEP)	4	2	1	7	14	3	0.25 (NS)

The same problem of distinguishing between ratings 1 and 2, that is between "very few" and "occasional" examples of pictorial representation, was also reported for this index, but the reduction of existing data to an appropriate three-point scale would not produce a significant improvement in the obviously divergent results. Again, I believe, the problem of associating this index with the primary criterion of human/environmental interaction is largely responsible for the rating discrepancies, and this might well be overcome with appropriate training or instructional emphasis.

IX PERSONAL INVOLVEMENT - (A) QUESTIONS

	RATING				TOTAL	MODAL RATING	K.S.D. P
	0	1	2	3			
THE WEB OF LIFE (CH. 1)	4	6	3		13	1	0.10 (NS)
(CH.18)	6	0	1		7	0	0.53 (S)
(CH.41)	5	6	2		13	0/1	0.10 (NS)
HOW MANY PEOPLE (ASEP)	0	0	17		17	2	0.67 (S)
LIFE IN FRESHWATER (ASEP)	0	7	10		17	2	0.33 (S)
THE EARTH (ASEP)	5	5	4		14	0/1	0.05 (NS)

(CH.18)	5	0	0	2	7	0	0.47 (S)
(CH.41)	4	5	1	3	13	1	0.19 (NS)
HOW MANY PEOPLE (ASEP)	0	0	3	14	17	3	0.57 (S)
LIFE IN FRESHWATER (ASEP)	0	1	1	15	17	3	0.63 (S)
THE EARTH (ASEP)	4	2	1	7	14	3	0.25 (NS)

The same problem of distinguishing between ratings 1 and 2, that is between "very few" and "occasional" examples of pictorial representation, was also reported for this index, but the reduction of existing data to an appropriate three-point scale would not produce a significant improvement in the obviously divergent results. Again, I believe, the problem of associating this index with the primary criterion of human/environmental interaction is largely responsible for the rating discrepancies, and this might well be overcome with appropriate training or instructional emphasis.

IX PERSONAL INVOLVEMENT - (A) QUESTIONS

	RATING			TOTAL	MODAL RATING	K.S.D. P
	0	1	2	3			
THE WEB OF LIFE (CH. 1)	4	6	3		13	1	0.10 (NS)
(CH.18)	6	0	1		7	0	0.53 (S)
(CH.41)	5	6	2		13	0/1	0.10 (NS)
HOW MANY PEOPLE (ASEP)	0	0	17		17	2	0.67 (S)
LIFE IN FRESHWATER (ASEP)	0	7	10		17	2	0.33 (S)
THE EARTH (ASEP)	5	5	4		14	0/1	0.05 (NS)

In spite of occasional protests on the coarseness of this scale, the rating distribution was in several cases virtually random, possibly again through failure to recognize the dependence of this index on the primary environmental interaction criterion. It was also pointed out that the rating intervals seemed unequal, with the second interval (1-2) larger than the first.

According to the given definition, this index provides no information on the proportion of questions of environmental significance, and should be modified to take account of this. It is

important, however, to maintain some information on the total number, and this may be achieved either by including another index of proportion and retaining the present scheme, or by replacing the existing index with a composite fraction incorporating both total and criterion-dependent numbers.

X PERSONAL INVOLVEMENT - (B) PRACTICAL ACTIVITIES

	RATING				TOTAL	MODAL RATING	K.S.D. P
	0	1	2	3			
THE WEB OF LIFE (CH. 1)	11	2	0		13	0	0.51 (S)
(CH.18)	7	0	0		7	0	0.67 (S)
(CH.41)	12	1	0		13	0	0.59 (S)
HOW MANY PEOPLE (ASEP)	0	2	15		17	2	0.55 (S)
LIFE IN FRESHWATER (ASEP)	0	3	13		16	2	0.46 (S)
THE EARTH (ASEP)	7	2	5		14	0	0.17 (NS)

Although the ratings for this index were generally much more concordant than those on the previous scale, the same comments on both interpretation and suggested modifications are also relevant in this case. An additional point of interest, made by many of the judges, was that textbooks such as "The Web of Life" are often accompanied by a separate laboratory or practical manual, so that an independent rating of the textbook on this index may give a misleading result. The same cautionary note would probably also apply to index IX, since a laboratory manual might well be expected to have a strong emphasis on open questions.

CONCLUSION

It is obvious from the discussion of individual index results that several modifications will be needed to improve the rating reliability of this instrument. A number of alternatives have already been suggested, and these will be examined more closely before the second trial. Apart from these changes to the instrument

X PERSONAL INVOLVEMENT - (B) PRACTICAL ACTIVITIES

	RATING 0	1	2	3	TOTAL	MODAL RATING	K.S.D. P
THE WEB OF LIFE (CH. 1)	11	2	0		13	0	0.51 (S)
(CH.18)	7	0	0		7	0	0.67 (S)
(CH.41)	12	1	0		13	0	0.59 (S)
HOW MANY PEOPLE (ASEP)	0	2	15		17	2	0.55 (S)
LIFE IN FRESHWATER (ASEP)	0	3	13		16	2	0.46 (S)
THE EARTH (ASEP)	7	2	5		14	0	0.17 (NS)

Although the ratings for this index were generally much more concordant than those on the previous scale, the same comments on both interpretation and suggested modifications are also relevant in this case. An additional point of interest, made by many of the judges, was that textbooks such as "The Web of Life" are often accompanied by a separate laboratory or practical manual, so that an independent rating of the textbook on this index may give a misleading result. The same cautionary note would probably also apply to index IX, since a laboratory manual might well be expected to have a strong emphasis on open questions.

CONCLUSION

It is obvious from the discussion of individual index results that several modifications will be needed to improve the rating reliability of this instrument. A number of alternatives have already been suggested, and these will be examined more closely before the second trial. Apart from these changes to the instrument itself, the major problem of interpretation must also be overcome, and this can probably be achieved in several ways. Tighter definition of criteria, together with the inclusion of more and better illustrative examples should certainly improve the results, but it will also be necessary to have some personal discussion with the prospective judges in order to clarify, and thus if possible to compensate for serious individual interpretative differences. The financial implications of this condition will obviously necessitate a local, rather than a National trial, but this should involve no loss of effectiveness, and may well have quite the opposite effect.

ENVIRONMENTAL EDUCATION RESEARCH PROJECT

CONTENT ANALYSIS CRITERIA

These criteria are represented by ten independent indices related to various aspects of environmental education and general presentation. They have been developed for application to all text and general reference books, pamphlets, and other written educational resource materials. The first of these indices is fundamental, and if this has no positive score then the others are irrelevant. The basic analytical unit for books will in most cases be the chapter, though pamphlets and other sectional materials may be assessed as integral units.

R. D. LINKE
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I ENVIRONMENTAL EMPHASIS

This is the first, and probably the most important analytical category, and represents a measure of the anthropocentric environmental interaction emphasis, or the relationship between man and his biophysical environment. It should be stressed that this measure concerns only explicit interactions with the biophysical environment, that is the natural world exclusive of purely moral or social human issues. This index is based on a four-point rating scale, as shown below, and is determined by the degree of recurrence of explicit references to some form of interaction between man and his biophysical environment. Thus although the total number of references may influence the assessment, it should be concerned largely with their distribution, which will determine the persistence and therefore impact of an environmental theme. Examples of interactive references might include such statements as "This land has been cleared of native vegetation and resown with crops or better pasture plants", and "The use of chemicals to control an insect can have effects other than those expected", whereas other statements, such as "Other animals tend to live together as a group" would not be considered as positive examples in this class.

RATING	
0	No explicit interaction references
1	Rare or widely dispersed references
2	Occasional interaction references
3	Consistent or recurrent references

II QUALITATIVE ENVIRONMENTAL INDEX

This is a measure of both the nature and intensity of explicit environmental interaction. The rating is based on a five-point scale, as shown below, but these divisions are not mutually exclusive - that is, a single chapter or unit may present both positive (advantageous) and negative (disadvantageous) aspects of human/environmental interaction, and would therefore be scored in both + and - divisions. Any beneficial or detrimental effects of interaction made with reference to either human or environmental interests would be scored appropriately on this scale, though in most cases the effects should be discussed in mutual terms.

RATING

Strongly beneficial or advantageous

four-point rating scale, as shown below, and is determined by the degree of recurrence of explicit references to some form of interaction between man and his biophysical environment. Thus although the total number of references may influence the assessment, it should be concerned largely with their distribution, which will determine the persistence and therefore impact of an environmental theme. Examples of interactive references might include such statements as "This land has been cleared of native vegetation and resown with crops or better pasture plants", and "The use of chemicals to control an insect can have effects other than those expected", whereas other statements, such as "Other animals tend to live together as a group" would not be considered as positive examples in this class.

RATING	
0	No explicit interaction references
1	Rare or widely dispersed references
2	Occasional interaction references
3	Consistent or recurrent references

II QUALITATIVE ENVIRONMENTAL INDEX

This is a measure of both the nature and intensity of explicit environmental interaction. The rating is based on a five-point scale, as shown below, but these divisions are not mutually exclusive - that is, a single chapter or unit may present both positive (advantageous) and negative (disadvantageous) aspects of human/environmental interaction, and would therefore be scored in both + and - divisions. Any beneficial or detrimental effects of interaction made with reference to either human or environmental interests would be scored appropriately on this scale, though in most cases the effects should be discussed in mutual terms.

RATING	
++	Strongly beneficial or advantageous interaction.
+	Advantageous human/environmental relationship.
0	Neutral interaction, with no explicit advantage or disadvantage to either part.
-	Detrimental human/environmental relationship.
--	Strongly detrimental or harmful interaction.

III CONSERVATIONAL CLASSIFICATION

This index is concerned with explicit conservationistic considerations, namely the long-term management and beneficial use of natural resources. It involves a single chapter or unit classification into one of four divisions, determined by the characteristics shown on the scale below. It should be emphasised that this decision is a type classification based on an impression of predominant emphasis, and involves no rating of degree.

CLASSIFICATION	
AC	Anti-conservationistic, involving an implicit or explicit rejection of long-term environmental considerations.
O	Indifferent or non-conservationistic, implying no reference (positive or otherwise) to long-term considerations.
C(S)	Conservationistic/Single Variable:- involving explicit long-term considerations with respect to a single industry, organism or issue.
C(M)	Conservationistic/Multi-Variable:- involving explicit long-term considerations with respect to more complex ecological interactions.

IV EMOTIVE INTENSITY

This index is intended to measure the emotive impact of the environmental theme, and is therefore related only to those units with a positive classification in category I (Environmental Emphasis). The rating is based on a four-point scale, as shown below, and is determined by the overall impact of emotive words and phrases associated with environmental references. In this sense the rating is probably more a feature of verbal emotive strength than frequency, but this must be assessed in the general context of the unit. For example the terms "destroy" and "wipe out" may be used in a more or less emotive sense, depending on the context in which they occur.

RATING	
0	Non-emotive (discussed in purely "scientific" terms).
1	Weakly emotive.
2	Moderately emotive.
3	Strongly emotive.

that this decision is a type classification based on an impression of predominant emphasis, and involves no rating of degree.

CLASSIFICATION

AC	Anti-conservationistic, involving an implicit or explicit rejection of long-term environmental considerations.
0	Indifferent or non-conservationistic, implying no reference (positive or otherwise) to long-term considerations.
C(S)	Conservationistic/Single Variable:- involving explicit long-term considerations with respect to a single industry, organism or issue.
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RATING

0	Non-emotive (discussed in purely "scientific" terms).
1	Weakly emotive.
2	Moderately emotive.
3	Strongly emotive.

V SUBJECT AREA

This involves a classification based on four independent divisions or subject areas, as shown below, but the alternatives are not mutually exclusive, so that a single unit may be classified in more than one area. The decision should be based, however, on an assessment of the predominant subject emphasis, at least as this relates to the environmental theme outlined in previous categories.

CLASSIFICATION	
BIOPHYSICAL	Physical or Biological interaction between man and his natural environment, including all forms of work, physiological influences or health etc.
SOCIAL	Emphasising social aspects of the man/environmental interaction theme, including various anthropological, traditional and political influences.
ECONOMIC	Emphasising economic aspects of the man/environmental interaction theme, including trade or other direct financial influences.
AESTHETIC	Emphasising aspects of beauty or form, and probably including obscure references to such things as the "quality of life".

VI PREDOMINANT REGIONAL EMPHASIS

This classification is probably obvious, and is based on two consecutive dichotomous decisions, though again a single unit may be classified in more than one division. The regional emphasis relates also to the environmental theme, and probably reflects the degree of emphasis placed on examples used to substantiate interaction references (classified local).

CLASSIFICATION	
GENERAL	Predominance of global or general references, not related to specific cases or geographical areas.
LOCAL	Emphasis on specific case studies or with respect to stated limits, though some generalisations may also be used.

AUSTRALIA (National, State or local municipal areas)

ELSEWHERE (e.g. U.K., U.S.A., etc.)

VII QUANTITATIVE EMPHASIS

This index, based on a four-point rating scale, is a measure of the recurrence of statistical data related to environmental interactions as described in category I (Environmental Emphasis). Thus although this rating may be influenced by the overall amount of data, it should be determined largely on the basis of distribu-

	traditional and political influences.
ECONOMIC	Emphasising economic aspects of the man/environmental interaction theme, including trade or other direct financial influences.
AESTHETIC	Emphasising aspects of beauty or form, and probably including obscure references to such things as the "quality of life".

VI PREDOMINANT REGIONAL EMPHASIS

This classification is probably obvious, and is based on two consecutive dichotomous decisions, though again a single unit may be classified in more than one division. The regional emphasis relates also to the environmental theme, and probably reflects the degree of emphasis placed on examples used to substantiate interaction references (classified local).

CLASSIFICATION	
GENERAL	Predominance of global or general references, not related to specific cases or geographical areas.
LOCAL	Emphasis on specific case studies or with respect to stated limits, though some generalisations may also be used.

AUSTRALIA	ELSEWHERE
(National, State or local municipal areas)	(e.g. U.K., U.S.A., etc.)

VII QUANTITATIVE EMPHASIS

This index, based on a four-point rating scale, is a measure of the recurrence of statistical data related to environmental interactions as described in category I (Environmental Emphasis). Thus although this rating may be influenced by the overall amount of data, it should be determined largely on the basis of distribution. The data included in this category may be presented either in the text, or in separate tables, diagrams, graphs or pictorial legends. This classification should not include general comparative statements such as "more" or "less", but may include more specific quantitative estimates, such as fractions or rounded percentages.

RATING

0	No data presented, purely descriptive.
1	Rare reference to statistical data.
2	Occasional reference to statistical data.
3	Frequent or recurrent reference to data.

VIII PICTORIAL EMPHASIS

This index, based on a four-point rating scale, is intended to measure the overall pictorial emphasis of the unit in relation to the environmental aspect already outlined. It should be based on the frequency, distribution and size (or estimated proportion of total area) of all pictorial segments, including photographs, diagrams and line drawings, maps, charts, graphs and tables. These may not necessarily relate to specific references in the text, but should nevertheless be consistent with the general context, and related to the environmental theme.

RATING

0	No relevant pictorial segments presented.
1	Very few, or rare pictorial segments.
2	Occasional relevant pictorial segments.
3	Many or frequent pictorial segments, probably forming a large part of the total unit area.

IX PERSONAL INVOLVEMENT - (A) QUESTIONS

This category concerns any books or other materials with an explicit educational role, and involves a three-point rating scale based on the total number of questions with some obvious or explicit environmental relevance. This index takes no account of the position of these questions within each chapter or analytical unit, nor does it include rhetorical questions, where answers are subsequently given in the course of the text, but concerns only open questions of environmental significance.

RATING

0	No questions of environmental significance.
1	Few or occasional questions of environmental significance.
2	Many or frequent questions of environmental significance.

X PERSONAL INVOLVEMENT - (B) PRACTICAL ACTIVITIES

This category, as with IX, concerns any books or other materials

to measure the overall pictorial emphasis of the unit in relation to the environmental aspect already outlined. It should be based on the frequency, distribution and size (or estimated proportion of total area) of all pictorial segments, including photographs, diagrams and line drawings, maps, charts, graphs and tables. These may not necessarily relate to specific references in the text, but should nevertheless be consistent with the general context, and related to the environmental theme.

RATING

0	No relevant pictorial segments presented.
1	Very few, or rare pictorial segments.
2	Occasional relevant pictorial segments.
3	Many or frequent pictorial segments, probably forming a large part of the total unit area.

IX PERSONAL INVOLVEMENT - (A) QUESTIONS

This category concerns any books or other materials with an explicit educational role, and involves a three-point rating scale based on the total number of questions with some obvious or explicit environmental relevance. This index takes no account of the position of these questions within each chapter or analytical unit, nor does it include rhetorical questions, where answers are subsequently given in the course of the text, but concerns only open questions of environmental significance.

RATING

0	No questions of environmental significance.
1	Few or occasional questions of environmental significance.
2	Many or frequent questions of environmental significance.

X PERSONAL INVOLVEMENT - (B) PRACTICAL ACTIVITIES

This category, as with IX, concerns any books or other materials with an explicit educational role, and involves a three-point rating scale based on the total number of practical activities having some explicit environmental significance suggested or outlined in the unit. This index again takes no account of the position of these activities within each chapter or analytical unit, nor does it involve those activities with prescribed solutions or results, but concerns only open activities of some environmental significance.

RATING	
0	No practical activities with environmental significance.
1	Few or occasional activities with environmental significance.
2	Many or frequent activities with environmental significance.

TITLE "Biological Science : The Web of Life" CHAPTER/~~UNIT~~ 16

I ENVIRONMENTAL EMPHASIS

0	1	2	3
			X

II QUALITATIVE ENVIRONMENTAL INDEX

--	-	0	+	++
	X		X	

III CONSERVATIONAL CLASSIFICATION

AC	D	C(S)	C(M)
			X

IV EMOTIVE INTENSITY

0	1	2	3
X			

V SUBJECT AREA

[X] BIOPHYSICAL [ ] ECONOMIC

[ ] SOCIAL [ ] AESTHETIC

VI PREDOMINANT REGIONAL EMPHASIS

LOCAL		GENERAL
AUSTRALIA	ELSEWHERE	
X		

VII QUANTITATIVE EMPHASIS

0	1	2	3
			X

VIII PICTORIAL EMPHASIS

0	1	2	3
			X

II QUALITATIVE ENVIRONMENTAL INDEX

--	-	0	+	++
	X		X	

III CONSERVATIONAL CLASSIFICATION

AC	0	C(S)	C(M)
			X

IV EMOTIVE INTENSITY

0	1	2	3
X			

V SUBJECT AREA

X	BIOPHYSICAL		ECONOMIC
	SOCIAL		AESTHETIC

VI PREDOMINANT REGIONAL EMPHASIS

LOCAL		GENERAL
AUSTRALIA	ELSEWHERE	
X		

VII QUANTITATIVE EMPHASIS

0	1	2	3
			X

VIII PICTORIAL EMPHASIS

0	1	2	3
			X

IX PERSONAL INVOLVEMENT - (A) QUESTIONS

0	1	2
		X

X PERSONAL INVOLVEMENT - (B) PRACTICAL ACTIVITIES

0	1	2
X		

ASSESSMENT BY R. D. Linke

DATE 16/6/72

ENVIRONMENTAL EDUCATION CONTENT ANALYSIS

"BIOLOGICAL SCIENCE : THE WEB OF LIFE" (Chapter 16)

INDEX NUMBER	CLASSIFICATION OR RATING	REASONS
I	3	Chapter deals with population growth and associated problems of food production, agricultural ecology and methods of pest control.
II	+/-	Positive aspects of agricultural techniques (chemical fertilisation, chemical and biological pest control), and negative aspects (overgrazing and soil erosion, pesticide contamination) are both presented with moderate emphasis.
III	C(M)	Long-term considerations are presented (e.g. "predict undesirable changes before they become irreversible" p.318) with reference to various ecological interactions.
IV	0	Presentation made on purely rational grounds, and emotive terms avoided or subdued within the general scientific context.
V	BIOPHYSICAL	Occasional references made to Social (pp.305, 306) and Economic aspects (p.317), but the predominant influence is biological.
VI	LOCAL (AUST.)	Many general references are made with respect to the influence of man on natural ecosystems, but there is an emphasis on Australian case studies and examples.
VII	3	Statistical data is given on 12 of the 17 pages in this chapter.
VIII	3	Photographs(7), Line drawings(3), Maps(2), Tables(4), and Graphs constitute 30-40% of the total area. Most of these are given specific reference in the text.
IX	2	16 Questions (2 full pages) are presented at the end of the chapter.
X	0	No practical activities are suggested in this chapter.

R. D. LINKE 16/6/72